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tract was constantly greater or less in different persons with little reference to the position of the pattern line or its direction. The chief ground of judging the distance traversed by the hand is the time occupied by the motion; to judge differentially of rapidity requires much practice. This appeared in testing Vierordt's statement that a point drawn across the hand seemed smaller the more rapidly it was moved, and by drawing threads and wires with different rapidities between the thumbs and fingers of passive hands. Thus if the duration of the impulse and of the movement is the same, rapidity is generally neglected. Equal volitional impulses give rise to the impression of equal rapidity.

Substantially all these results and others were obtained by a different method, which makes the long discussion that closes this article unnecessary, as long ago as early in 1882, and published in the English quarterly journal, *Mind*, by G. Stanley Hall and E. M. Hartwell, under the title *Bilateral Asymmetry of Function*. These observers also showed that the eyes follow the same asymmetric tendency; that there is a constant error, which was measured, in attempting to bring the index fingers into the position which is designated by Loeb as the nuclear point; that there is a constant asymmetry in reaction time, in maximal clenching movements, etc.

Untersuchungen über die Wärmestrahlung des menschlichen Körpers.

Von A. MASJE. Virchow's Archiv, January and February, 1887.

These extended and valuable researches were made in Zürich, and in part under the direction of Prof. H. Eichorst, and embrace the study of heat radiation in both normal and morbid, especially fever, states, but later pathological studies are yet to be described in detail. The formula of Dulong and Petit, that the heat radiating from a body is proportional to the fourth power of its absolute temperature, does not apply to living bodies, which lack a constant constitution internally and superficially. All formulae agree in making radiation decrease with decrease of heat for constant conditions with lifeless bodies, while for the human body, especially in fever where anti-febrile medicines are used, radiation of heat increases as the body cools. All previous studies, from Scharling in 1849 to d'Arsonval in 1885, followed the same method. A naked man was placed in a receptacle in a room of constant temperature, and after a given time the difference of temperature between the receptacle and the room was made the basis of calculation. This, however, does not show the normal, but rather the artificial loss of heat. The method used by Masje was to allow the heat from any exposed part of the body to radiate through a closed card-box, to avoid air movements, upon a fine metallic electric conductor, whereby its resistance is changed proportionally to the elevation of the temperature. Another equilibrating conductor also, of long strips of tin foil on gutta percha, is used, and between the two is a galvanometer. When the two conductors are at constant temperature and a current is allowed to pass through them, the effect of the two can be so exactly balanced by a rheochord that no deviation of the mirror of the galvanometer is observed. But if one is exposed to the radiant heat of the hand, the resulting difference of temperature in the conductors is very accurately recorded by the galvanometer in excursions directly proportional to the heat absorbed by the conductors. By this method the following results were reached. After uncovering

a part of the body usually covered, the radiation of heat from it increases, not always constantly, but with variations, and this increase is more rapid if the surrounding temperature is low. Parts normally uncovered, as the hand and face, radiate heat about uniformly all times of day. Under the same meteorological conditions of atmospheric humidity and barometric state, radiation in the same person varies from day to day, as does the relative radiation from different parts of the body. Radiation is least on parts of the body covered with hair; it is more on flexor than on extensor sides of the limbs, especially the arms; on symmetrical points it varies but little in adults, but sometimes much in children; the average radiation from covered parts is less in women than in men. Extensive tables of the amount of radiation from equal surfaces of different parts of the body are given. A moderately cold or warm bath increases radiation afterward, as well as after exercise or friction. After the inward use of antipyretics, radiation increases as the bodily temperature sinks. The author believes the cause for increase and decrease of radiation is to be sought in a change of the physical and chemical constitution of tissues which is under the control of the nervous system.

Einfluss des Nervensystems auf die thierische Temperatur. Von Dr. UGOLINO MOSSO. Virchow's Archiv, October, 1886.

This prize thesis, by a young brother of the well known physiologist of Turin, is a résumé of a more extended paper published in Italian. The valuable work of Heidenhain in 1884 presents the history of the conclusion now so fundamental in physiology, that muscle contraction develops heat. It is only bad batteries, however, that do so. If it could be shown that heat continues to be developed after the muscle has ceased to contract, that the increase of heat is not proportional to the work, that by the constant contraction of a muscle the temperature of an organism cannot be increased, and that the temperature of the body may diminish while the muscular work remains the same, then it may be inferred that heat production is an attendant but not necessary phenomenon of contraction. The first of the above statements was proven by stimulating reflex frogs, from the thighs of which calorimetric readings were taken. Dogs were allowed to run inside wheels six metres in circumference for six hours, and rectal measurements of temperature showed, after a rapid rise for the first hour, a gradual sinking for the following five hours, reaching the intermediate point between extremes of temperature at the beginning and end of the first hour, and at rest sinking rapidly below the former. The temperature of Dr. Mosso's body during a two days' march was not in relation to the work done. Again, strychnine increases the temperature of the animal body, even after it has fallen through the influence of curara, and in spite of the most complete immobility of the muscles. In dogs the rectal increase thus obtained is as much as three degrees. Of the three places, brain, sinus, and rectum, where measurements were taken, which were about alike, the sinus temperature always decreased with muscle work. In experimenting with drugs causing convulsions, temperature always increased before cramps, and the blood temperature in the right sinus often fell during cramps. In curarized animals a rapid and lasting elevation of temperature was observed as a result of the infliction of pain.